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**Spatial Data Standards for facilities, infrastructure, and environment
(SDSFIE)**

and

**Facility Management Standards for facilities, infrastructure, and
environment (FMSFIE)**

**HISTORY OF DEVELOPMENT, COORDINATION, &
BENEFITS**



CADD GIS
TECHNOLOGY CENTER
for facilities, infrastructure, & environment



CADD/GIS Technology Center

for facilities, infrastructure, and environment

- Originally established as the “Tri-Service CADD/GIS Technology Center” in 1992 at the Army Waterways Experiment Station, Information Technology Laboratory, Vicksburg, Mississippi .
- Established by the Army (including Army Corps of Engineers), Navy, and Air Force (i.e, Tri-Services).
- Center’s name changed to “CADD/GIS Technology Center for facilities, infrastructure, and environment” in July, 1999 to reflect a broader mission.
- CADD – Computer Aided Design & Drafting
- GIS – Geographic Information System

Participating DoD and Governmental Agencies

- **Participating Department of Defense (DoD) and Federal Government Agencies (as of January 2001):**
 - **U.S. Army Corps of Engineers**
 - **U.S. Army**
 - **U.S. Navy**
 - **U.S. Air Force**
 - **U.S. Marines**
 - National Aeronautics and Space Administration (NASA)
 - Defense Logistics Agency (DLA)
 - U.S. Coast Guard
 - General Services Administration (GSA)
 - National Institute of Building Sciences (NIBS)
 - U.S. Environmental Protection Agency

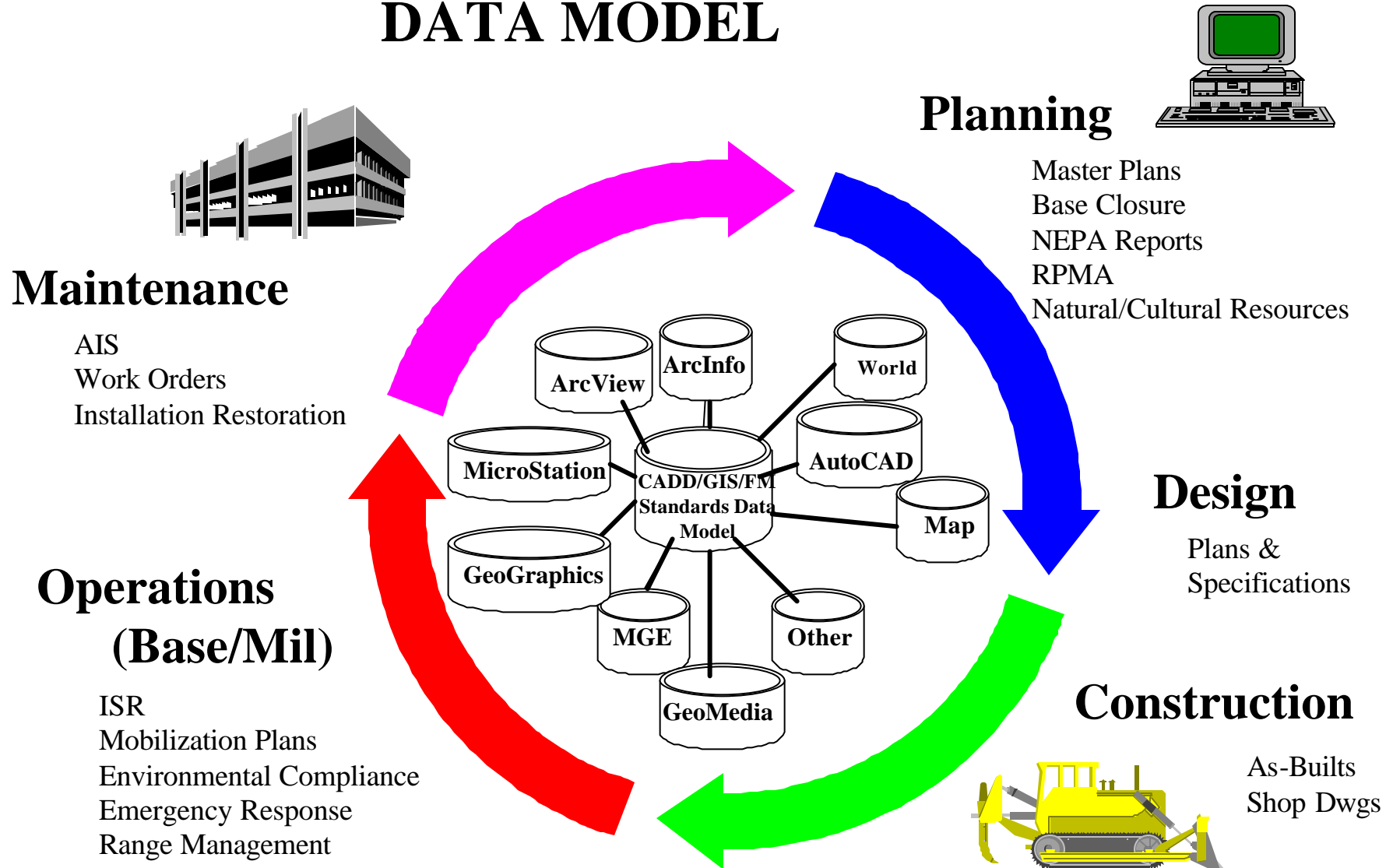
The Center's Approach to Data Standards Development for the Project/Installation Life Cycle

- Current CADD/GIS/FM Data Standards Development Efforts:
 - Part 1.0 – Architect-Engineer (A-E) CADD & GIS Deliverables
 - Part 2.0 – Architectural/Engineering/Construction (A/E/C) CADD Standards
 - Part 3.0 - Spatial Data Standards for facilities, infrastructure, & environment (SDSFIE) (GIS)
 - Part 4.0 - Facility Management Standards for facilities, infrastructure, & environment (FMSFIE) (FM)
 - Part 5.0 - Electronic Bid Solicitations (EBS)
 - Future – CADD & GIS Object Data Standards

Part 1.2 - A-E GIS Deliverables Standards

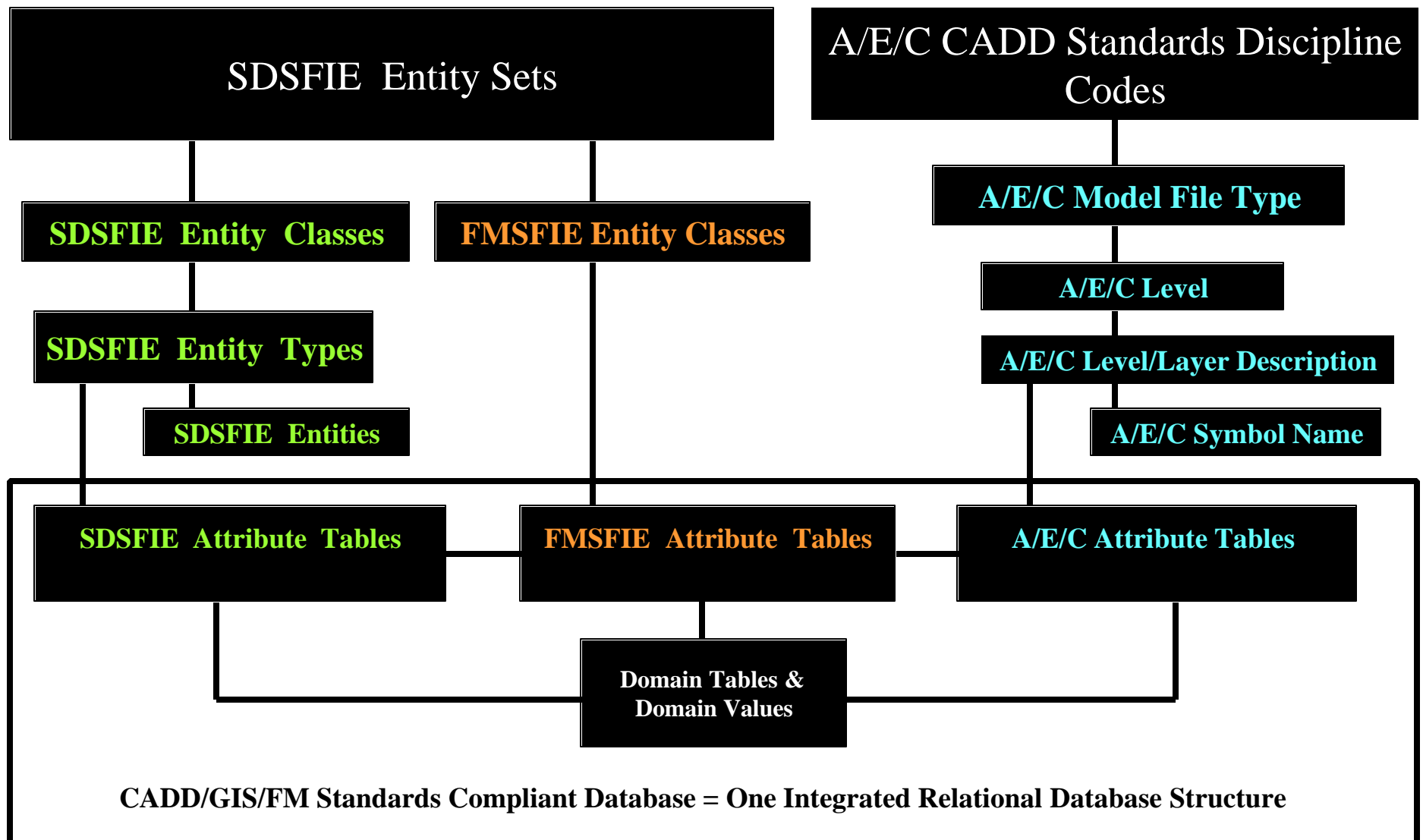
- Provides guidance for the preparation of Commerce Business Daily (CBD) announcements and contract provisions for use in acquiring the services of architect-engineer (A-E), and consulting firms, to prepare and deliver digital geospatial data and related products.
- Applies to geospatial data acquisition (i.e., surveying and mapping), digital map and geospatial data development, and delivery of the digital data to the end user.
- A Task Group consisting of DoD experts assisted in development.

PROJECT LIFE-CYCLE DATA MODEL



CADD/GIS/FM Standards Data Model

(Option 1 concept for initial incorporation of FMSFIE with SDSFIE & A/E/C CADD Standards. Began with TSSDS/TSFMS Release 1.80, February 1999)



Center Project No. 96.013 - Spatial Data Standards

The screenshot shows a web browser window with the address <http://tsc.wes.army.mil/products/TSSDS-TSFMS/tssds/html/>. The page header includes the CADD/GIS Technology Center logo and a navigation bar with links: Home, Events/Training, Contacts, The CADD/GIS Technology Center, Links, Products, Projects, and Groups. A left sidebar contains a list of links: News, Guidance, Download Standards, Symbology, Data Models, Project Development, Comments, FAQ, Papers, Presentations, and Other Sites. The main content area features a large 'Welcome...' graphic, followed by the text 'to the Spatial Data Standards (SDS) for Facilities, Infrastructure, and Environment'. Below this, a paragraph states: 'One of the major initiatives assigned to The Computer-Aided Design and Drafting (CADD)/Geographic Information System (GIS) Technology Center for Facilities, Infrastructure, and Environment has been the development of the Spatial Data Standards for Facilities, Infrastructure, and Environment (SDS). The SDS have focused on the development of graphic and nongraphic standards for GIS implementations at Air Force, Army, Navy, and Marine Corps installations, and U.S. Army Corps of Engineers Civil Works activities.'

- **The Spatial Data Standards for facilities, infrastructure, & environment (SDSFIE) are CADD/GIS Technology Center Project No. 96.013.**
- **Monthly Status Reports are provided on CADD/GIS Technology Center web site (<http://tsc.wes.army.mil>) under “Projects”.**
- **Typically, 2 “SDS Implementation Workshops” are provided each year at Vicksburg, Mississippi. See “Classes” area of CADD/GIS Technology Center web site.**
- **Download latest release and additional SDSFIE information from the “Products”, “Standards” area of the CADD/GIS Technology Center’s web site.**

Part 3: Spatial Data Standards for facilities, infrastructure, & environment (SDSFIE)

- Provides a standard graphic and nongraphic (database) format and structure for GIS implementations at Air Force, Army, Navy, and Marine Corps installations and Army Corps of Engineers Civil Works activities. Also provides a GIS standard for use by other Federal, State, and Local Government organizations, public utilities; and private industry.
- Provides a “nonproprietary” standard designed for use with commercially available “off-the-shelf” GIS and relational database software.
- Provides a GIS implementation schema for approved FGDC and DISA geospatial related data standards.
- Provides a grouping of geographically referenced (geospatial) features (i.e., features which can be depicted graphically on a map at their geographic location (coordinate). Each geospatial feature has an “attached” Attribute Table containing pertinent data about the geospatial feature.
- Called Tri-Service Spatial Data Standards (TSSDS) prior to July 1999. The acronym SDS was used from July 1999 until January 2001.

What is Geospatial Data?

Definition from Executive Order 12906:

- “Information that identifies the geographic location and characteristics of natural or constructed features and boundaries on the earth.”
- “This information may be derived from, among other things, remote sensing, mapping, and surveying technologies. Statistical data may be included in this definition at the discretion of the collecting agency.”

Geospatial Data Systems (GDS)

- Any automated system that employs data referenced to a location on the earth.
- Includes Geographic Information Systems (GIS's), Land Information Systems (LIS's), Remote Sensing (RS) Systems, Image Processing (IP) Systems, Computer-Aided Design and Drafting (CADD) Systems, Automated Mapping/Facilities Management (AM/FM) Systems, and Automated Mapping (AM) Systems.

Center Project No. 96.015 – Facility Management Standards

The screenshot shows a web browser window with the address <http://tsc.wes.army.mil/products/tssds-tsfrms/fms/fmsprods.asp>. The page header features the CADD/GIS Technology Center logo and a navigation bar with links: Home, Events/Training, Contacts, The CADD/GIS Technology Center, Links, Products, Projects, and Groups. A left sidebar contains a menu with links: News, Guidance, Download Standards, Meetings, Data Models, Project Development, Comments, FAQ, Papers, Presentations, and Other Sites. The main content area displays a large 'Welcome...' graphic, followed by the text 'to the Facility Management Standards (FMS) for Facilities, Infrastructure, and Environment'. Below this, a paragraph states: 'One of the major initiatives assigned to The Computer-Aided Design and Drafting (CADD)/Geographic Information System (GIS) Technology Center for Facilities, Infrastructure, and Environment has been the development of the Facility Management Standards for Facilities, Infrastructure, and Environment (FMS)'.

- **The Facility Management Standards for facilities, infrastructure, & environment (FMSFIE) is CADD/GIS Technology Center Project No. 96.015.**
- **Monthly Status Reports are provided on CADD/GIS Technology Center web site (<http://tsc.wes.army.mil>) under “Projects”.**
- **Download latest release and additional FMSFIE information from the “Products”, “Standards” area of the CADD/GIS Technology Center’s web site.**

Part 3: Facility Management Standards for facilities, infrastructure, & environment (FMSFIE)

- Provides a standard database format and structure for “business” and event data (e.g., inspections, repairs) related to SDSFIE geospatial features and/or A/E/C CADD objects, specifically for CADD/GIS Based implementations at Air Force, Army, Navy, & Marine Corps installations and Army Corps of Engineers Civil Works activities. Also provides a CADD/GIS Based Facility Management (FM) standard for use by other Federal, State, and Local Government organizations, public utilities; and private industry.
- Provides a “nonproprietary” standard designed for use with commercially available “off-the-shelf” CADD, GIS, FM, and relational database software.
- Provides a grouping of related attribute tables containing “business and event data.
- Called Tri-Service Facility Management Standards (TSFMS) prior to July 1999. The acronym FMS was used from July 1999 until January 2001.
- The first FMSFIE release was included with the TSSDS/TSFMS Release 1.80, which was published on CD-ROM in February 1999. Releases 1.90 and 1.95 were published on CD-ROM in December 1999 and April 2000, respectively. Release 2.00 was completed in January 2001.

GIS/FM Standards Development Coordination

- All DoD Organizations
- Other Federal Agencies
 - US Coast Guard
 - Veteran's Administration
 - Indian Affairs
 - GSA
 - EPA
 - FAA
 - Census Bureau
 - NASA
 - CIA
 - DOE
 - USGS
 - U.S. Forest Service
 - Housing and Urban Development
 - Panama Canal Commission
 - Tennessee Valley Authority
 - Department of Transportation
- CADD/GIS/Database Software Vendors
 - Intergraph
 - Bentley
 - Autodesk
 - ESRI
 - FIS
 - Maximo
 - Oracle
 - Microsoft
- Numerous State & Local Government Organizations, Universities, etc.
- Numerous Architect-Engineer Firms & Contractors

Spatial Data and Facility Management Standards - Coordination

Coordination Efforts With DoD & Federal Standards Development Initiatives Include:

- Federal Geographic Data Committee (FGDC)
 - *Center* Participation
 - Adoption of Subcommittee Products
 - Adoption of Metadata Standards
- Defense Information Systems Agency (DISA)
- Corporate Information Management (CIM) Initiatives
- Defense Environmental Security Corporate Information Management (DESCIM) Initiatives
- National Imagery and Mapping Agency (NIMA) (formerly Defense Mapping Agency (DMA)) Initiatives
- American National Standards Institute (ANSI)

Incorporation of Approved FGDC Data Standards

- The SDSFIE provides a GIS Implementation Schema for Approved Federal Geographic Data Committee (FGDC) Data Standards.
- Approved FGDC Soils, Vegetation, and Wetlands Classification Standards were incorporated in the TSSDS/TSFMS Release 1.80.

SDSFIE/FMSFIE Browser/Viewer/Printer
Configure Browse Print Filters Windows Help

Source Search

Search For: **FGDC**

- EPA Form 7550-6
- ERPIMS
- FGDC**
- FGDC Soils Classification
- FGDC Vegetation Classification
- FGDC Wetlands Classification
- FIS
- ISO

☒ List Domain Source/Reference
☒ Range Source/Reference

Select All
Select None
Begin Search
About Browsing by Source

Source Search Results For - FGDC --- 28 found

Entity Type Name --- flora_general_land_vegetation_area
Entity Type Name --- shoreline_bluff_crest_line
Entity Type Name --- soil_unit_area
Entity Type Name --- state_property_interest_site
Entity Type Name --- wetland_area
No Entity Name --- entries found!

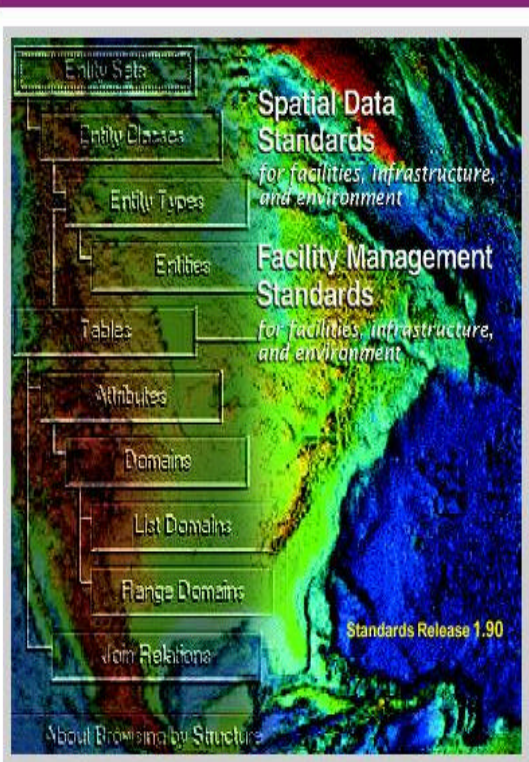
Attribute Name --- cdfedint + fedsite_id
Attribute Name --- cdfedint + int_typ_d
Attribute Name --- cdfedint + feat_desc
Attribute Name --- cdcoint + couint_id
Attribute Name --- cdcoint + int_typ_d
Attribute Name --- cdcoint + feat_desc
Attribute Name --- cdmunint + munint_id
Attribute Name --- cdmunint + int_typ_d
Attribute Name --- cdmunint + feat_desc
Attribute Name --- cdstainp + staint_id
Attribute Name --- cdstainp + int_typ_d
Attribute Name --- cdstainp + feat_desc
Attribute Name --- cdtwnint + twntint_id
Attribute Name --- cdtwnint + int_typ_d
Attribute Name --- cdtwnint + feat_desc
Attribute Name --- cdtriint + tribint_id
Attribute Name --- cdtriint + int_typ_d
Attribute Name --- cdtriint + feat_desc
Attribute Name --- hycznblf + bluff_id
Attribute Name --- hycznblf + feat_desc
List Domain Value --- d_govtyp + TOWNSHIP
List Domain Value --- d_govtyp + TRIBAL_RESERVE
List Domain Value --- d_zontyp + QUASI_PUBLIC
No Range Domain --- entries found!

Spatial Data and Facility Management Standards - Benefits

- Standard GIS and FM Data Collection Requirements
- One Training Program
- Common GIS and FM Applications
- Standard Implementation Procedures and Requirements
- Common Data Model which Permits the Sharing of Data
- Nonproprietary Data Model

Spatial Data Standards (SDSFIE) Implementation Workshops

- Six workshops have been provided from January 1999 – January 2001.
- Total of 180 students.



Spatial Data and Facility Management Standards - Benefits

♦ Community Interchange

– Fort Bragg

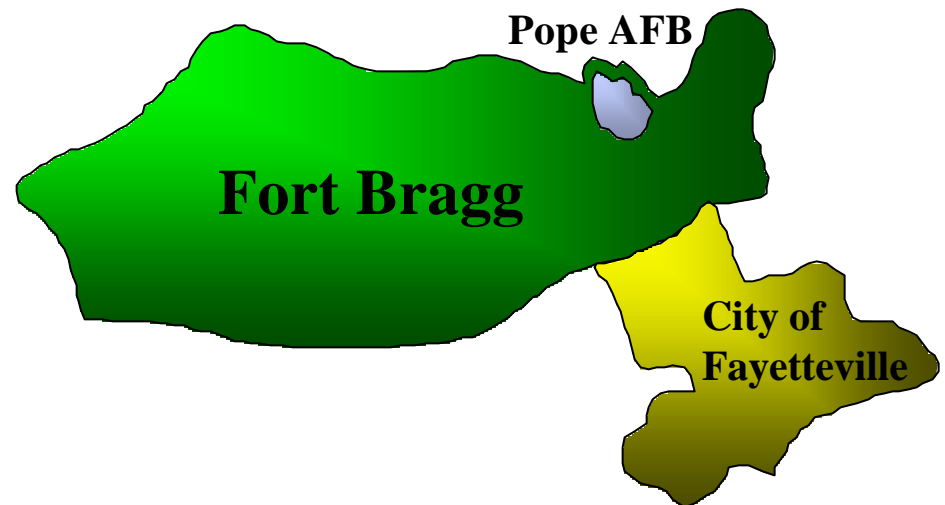
- ♦ Pope AFB Assets
- ♦ BRAC and Mobilization Plans
- ♦ Utilities and Drainage Interface

– Pope Air Force Base

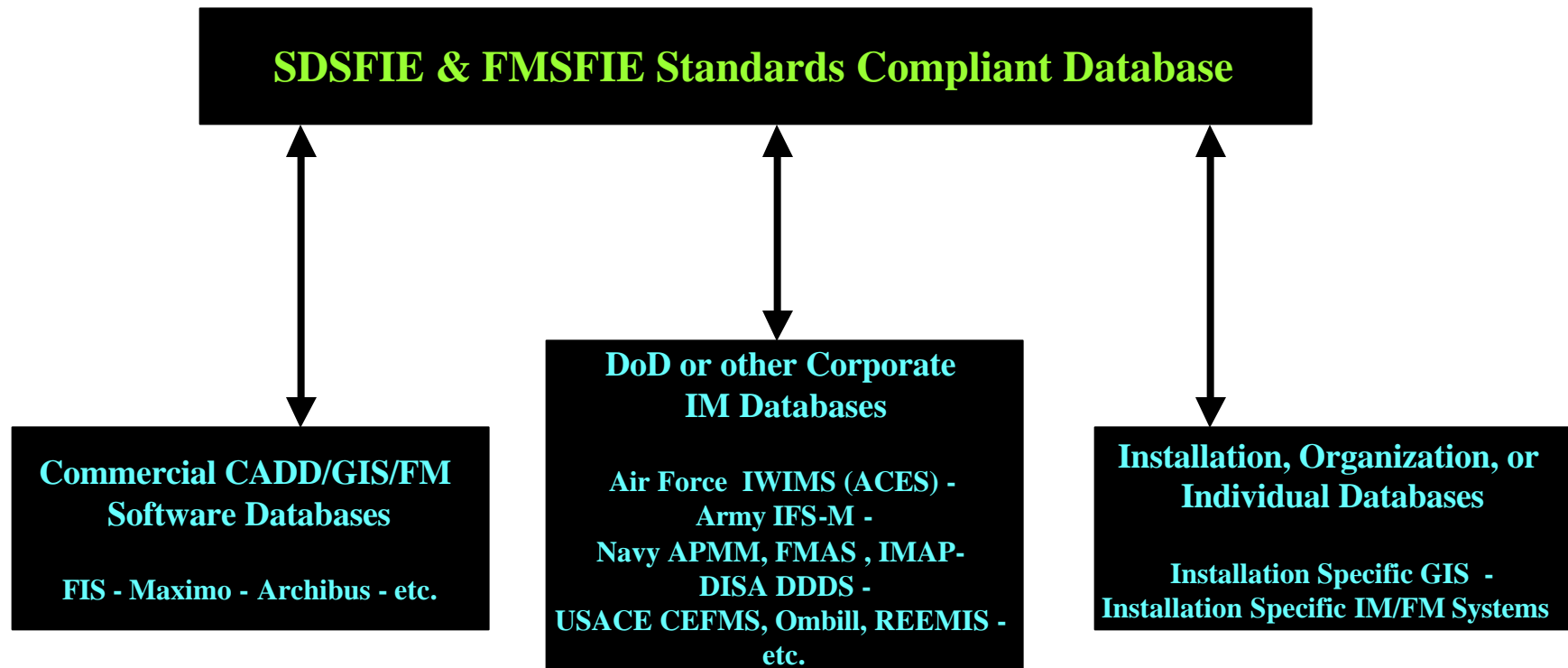
- ♦ Site Drawings and As-Builts

– City of Fayetteville

- ♦ Hurricane Evacuation Plan
- ♦ Cadastral Data and Demography
- ♦ Utilities and Drainage Interface



The SDSFIE & FMSFIE Data Model provides the ability to share data



Spatial Data and Facility Management Standards - Design Considerations

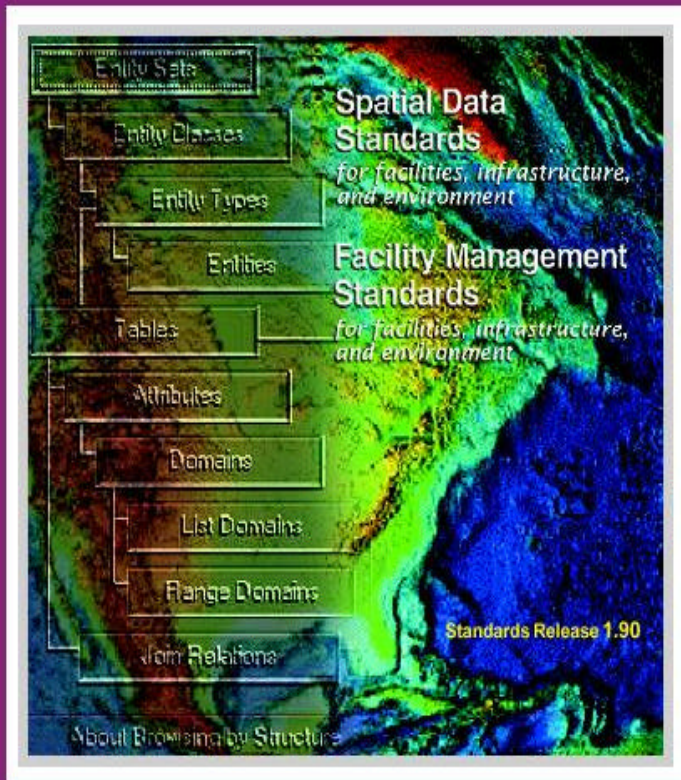
- **Must be compatible with the predominant Commercially Available CADD, GIS, & Relational Database Software.**
- **GIS and CADD Software include:**
 - ESRI Arc/Info - Bentley MicroStation - ESRI ArcView
 - Autodesk Map - Intergraph MGE - Autodesk AutoCAD
 - Intergraph GeoMedia - Bentley GeoGraphics
- **Relational Database Management System (RDBMS) Software includes:**
 - ANSI Standard Structured Query Language (SQL)
 - Informix SQL - Microsoft Access - ESRI SDE
 - Oracle SQL - Microsoft SQL Server
- **Operating Systems include:**
 - UNIX
 - Windows 95, 98, 2000, and NT

Spatial Data and Facility Management Standards – Software Tools

- **Interactive Windows Application**

- Self-contained Microsoft Visual Basic (32 bit) based Software Applications for Windows 95, 98, 2000, and NT.
- Runs on Windows 95, 98, 2000, and/or NT Personal Computer
- No Additional Software Required
- Distributed on CD-ROM and via Internet
- A “Living Application”; Versioning
- The current version (Release 2.00) was completed in January 2001.
- The current version is also available for download from The CADD/GIS Technology Center Internet Web Site <http://tsc.wes.army.mil>. Go to “Products”, then select either “Spatial Data Standards” or “Facility Management Standards.”

Spatial Data Standards (SDSFIE) & Facility Management Standards (FMSFIE) - Development History

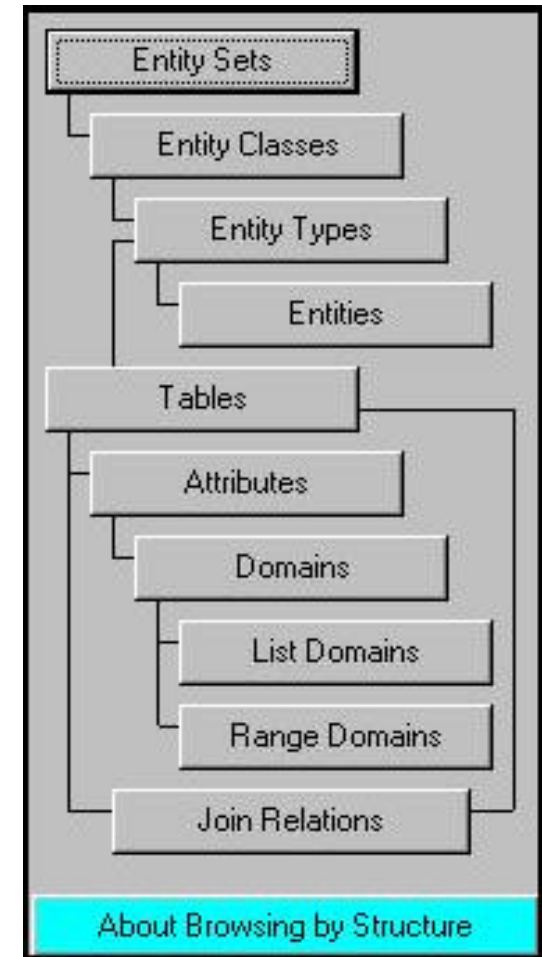


- TSSDS Release 1.20 - November 1993
- TSSDS Release 1.40 - August 1995
- TSSDS Release 1.60 - November 1996
- TSSDS Release 1.70 - August 1997
- TSSDS Release 1.75 - January 1998
- TSSDS/TSFMS Release 1.80 - February 1999
- SDS/FMS Release 1.90 - December 1999
- SDS/FMS Release 1.95 - April 2000
- SDSFIE/FMSFIE Release 2.00 – January 2001

Tri-Service Spatial Data Standards (TSSDS) & Tri-Service Facility Management Standards (TSFMS) - Release 1.80

TSSDS/TSFMS Release 1.80 contained the Spatial Data Standards and the 1st Release of the Facility Management Standards.

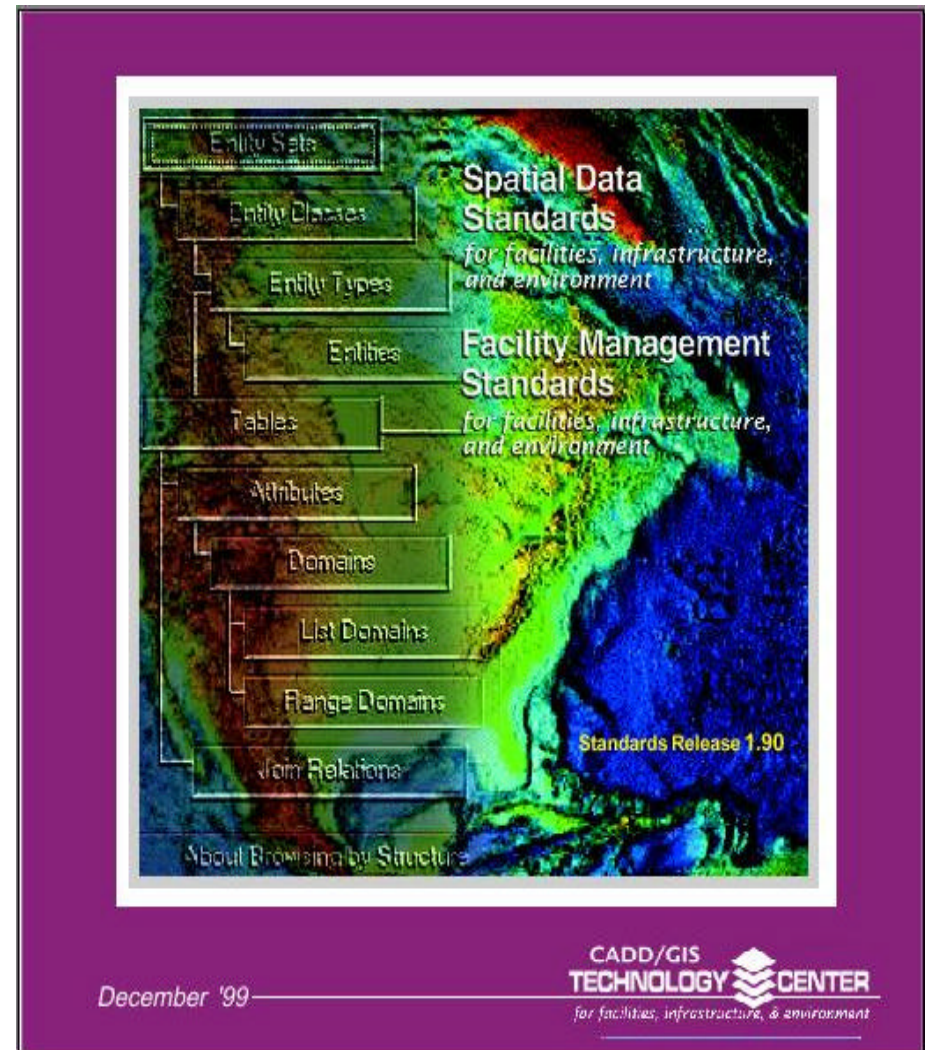
- Published in February 1999
- Over 4,400 CDs Distributed in 1999
- Over 1,100 downloads from Web Site by July 1999
- Major enhancements included:
 - Incorporation of FGDC Wetlands, Soils, and Vegetation Standards.
 - Incorporation of DISA data elements related to Facilities & Environmental Restoration/Compliance.
 - Incorporation of USACE Mississippi Valley Division's Regional Environmental & Engineering GIS (REEGIS).
 - Expansion of Military Range & Training.
 - Development of "Filter" Capability.
 - Upgraded Software Application (Browser & Generator).



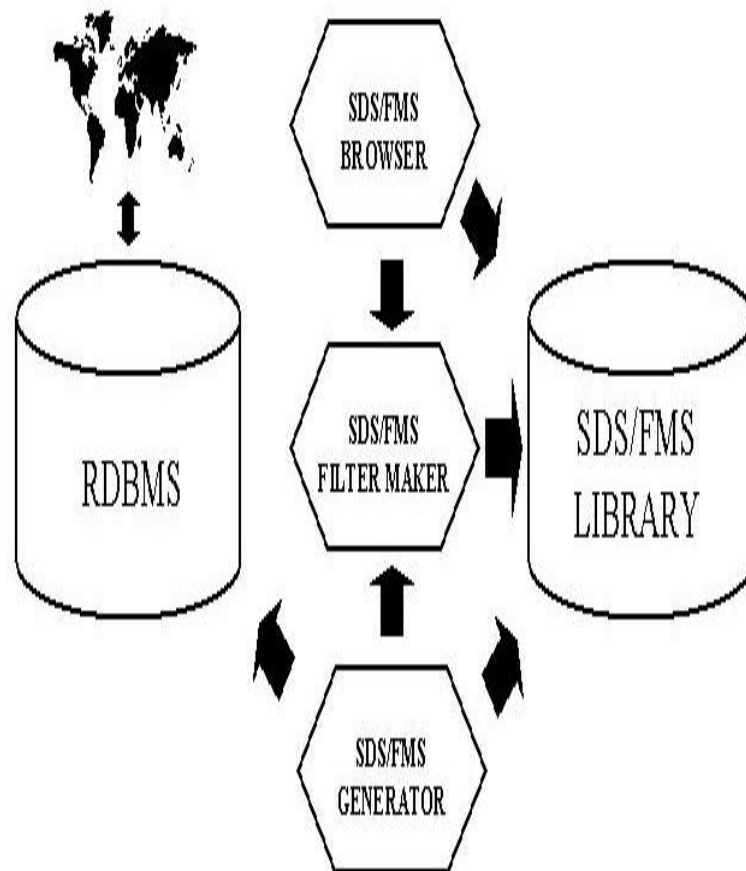
Spatial Data Standards (SDS) & Facility Management Standards (FMS) - Release 1.90

SDS/FMS Release 1.90 contained the Spatial Data Standards and the 2nd Release of the Facility Management Standards.

- Published in December 1999.
- Major enhancements included:
 - Updates to the SDS Symbol Sets and Symbology.
 - Development of one new Entity Set entitled "Future Projects".
 - Incorporation of new tables and domain values related to environmental sampling and analysis from Air Force Environmental Restoration Program Information Management System (ERPIMS).
 - Incorporation of new Features related to Military Range and Training and Corps of Engineers Civil Works Activities.

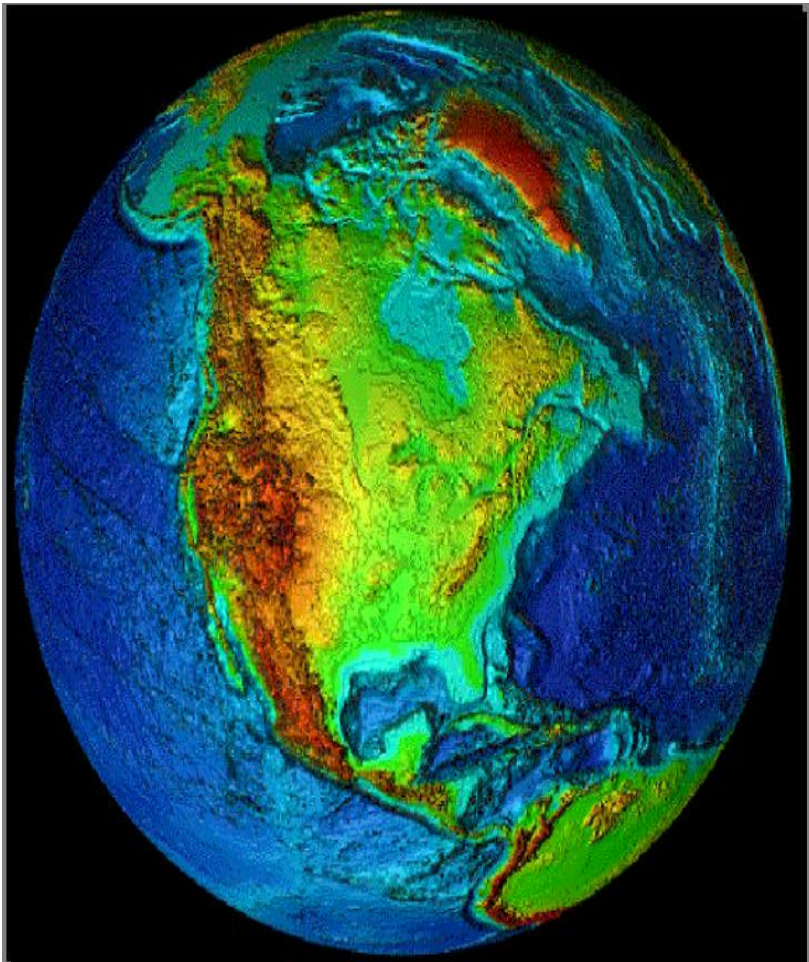


Spatial Data Standards (SDS) & Facility Management Standards (FMS) - Release 1.95



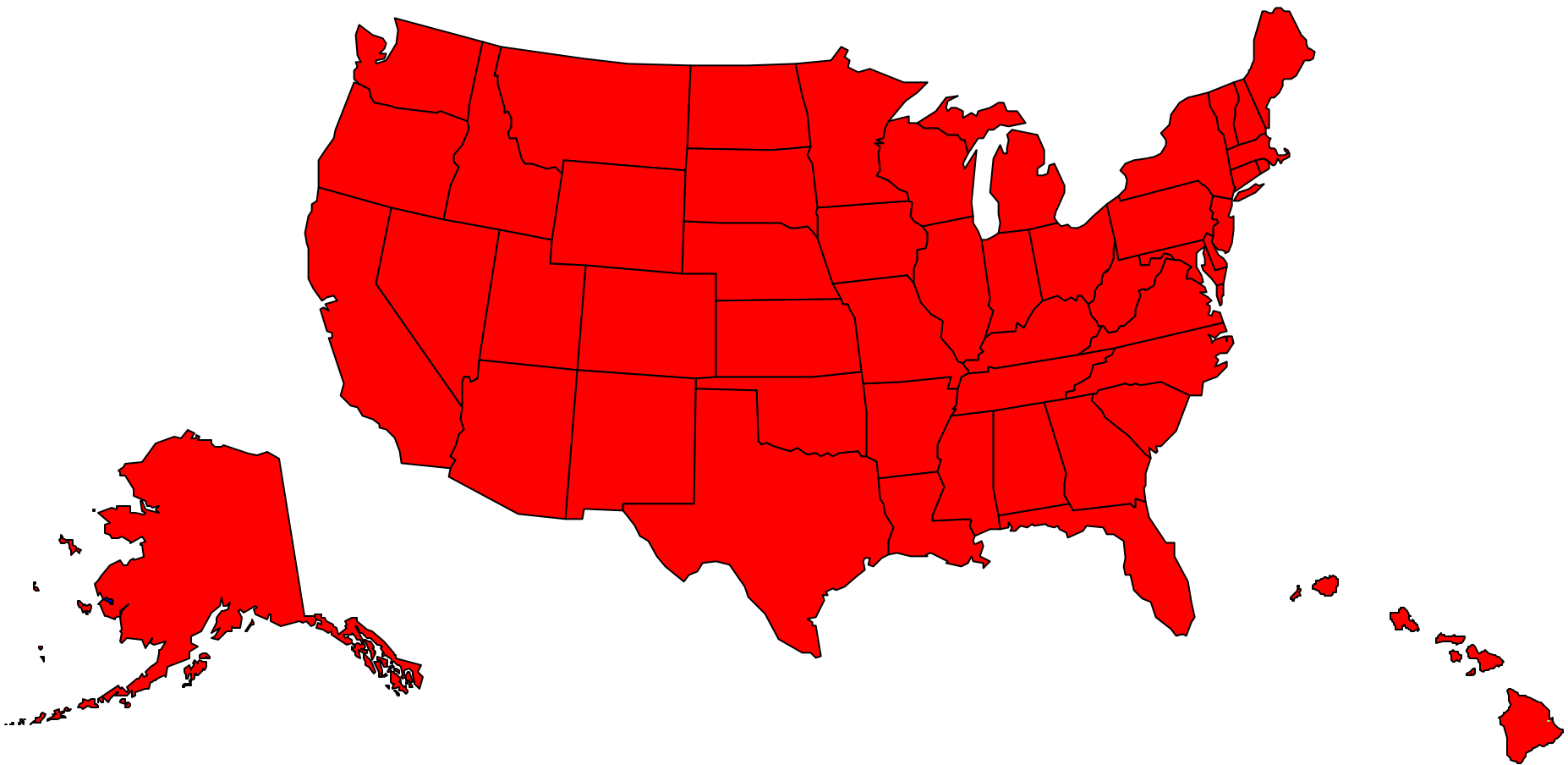
- Completed in April 2000.
- 500 CD-ROMs were published and distributed in May 2000 at the CADD/GIS Symposium & Exposition 2000 in St. Louis, Missouri.
- Major Enhancements included:
 - Developed Generator application for used with Intergraph GeoMedia.
 - Expanded Domain Tables based upon Air Force Environmental Restoration Program Information Management System (ERPIMS) database.
 - Incorporated additional U.S. Army Corps of Engineers (USACE) Mississippi Valley Division Regional Engineering & Environmental GIS (REEGIS) features.

SDSFIE & FMSFIE - Release 2.00



- Final Release 2.00 was completed in January 2001.
- Major Enhancements included:
 - Changed Acronyms to SDSFIE & FMSFIE.
 - Total Revision of Communications Entity Set.
 - Incorporated Space Management related features.
 - Incorporated additional real estate related data requirements from USACE REMIS/GIS effort.
 - Incorporated NIMA and DISA airfield data elements.
 - Incorporated additional environmental compliance and utility features and FM data requirements.
 - Made major enhancements to the SDSFIE/FMSFIE Toolbox (I.e., the suite of SDSFIE/FMSFIE Software Applications).

DoD Organizations in all 50 States Have Used the SDSFIE/FMSFIE



Organizations Around the World Have Requested the SDSFIE/FMSFIE



Australia

Sweden

Bahrain

Japan

Canada

China

Chile

United States

Columbia

Malaysia

India

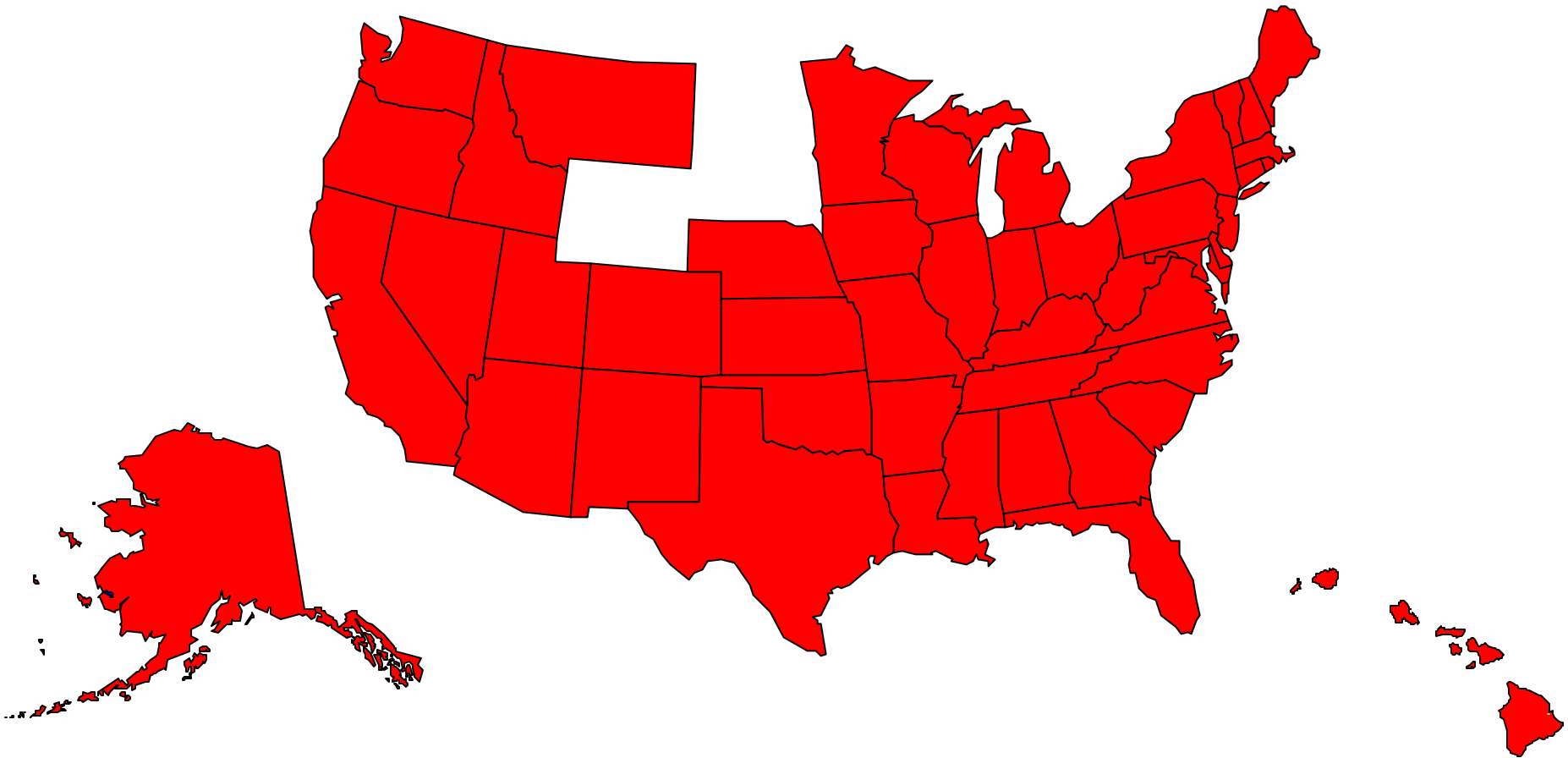
Poland

Italy

South Africa

England

Commercial Firms in 47 States Have Requested the SDSFIE/FMSFIE



State Agencies in 21 States Have Requested the SDSFIE/FMSFIE



Alaska	Kansas
Arkansas	Massachusetts
Arizona	Maryland
California	Mississippi
Connecticut	Montana
District of Columbia	
Florida	North Carolina
Georgia	North Dakota
Hawaii	Ohio
Indiana	Texas
	Vermont
	Wisconsin

Universities in 22 States Have Requested the SDSFIE/FMSFIE



Arkansas

Colorado

Florida

Illinois

Indiana

Louisiana

Massachusetts

Minnesota

Missouri

Mississippi

North Carolina

North Dakota

New Jersey

New Mexico

New York

Oklahoma

Pennsylvania

Texas

Utah

Virginia

Washington

West Virginia

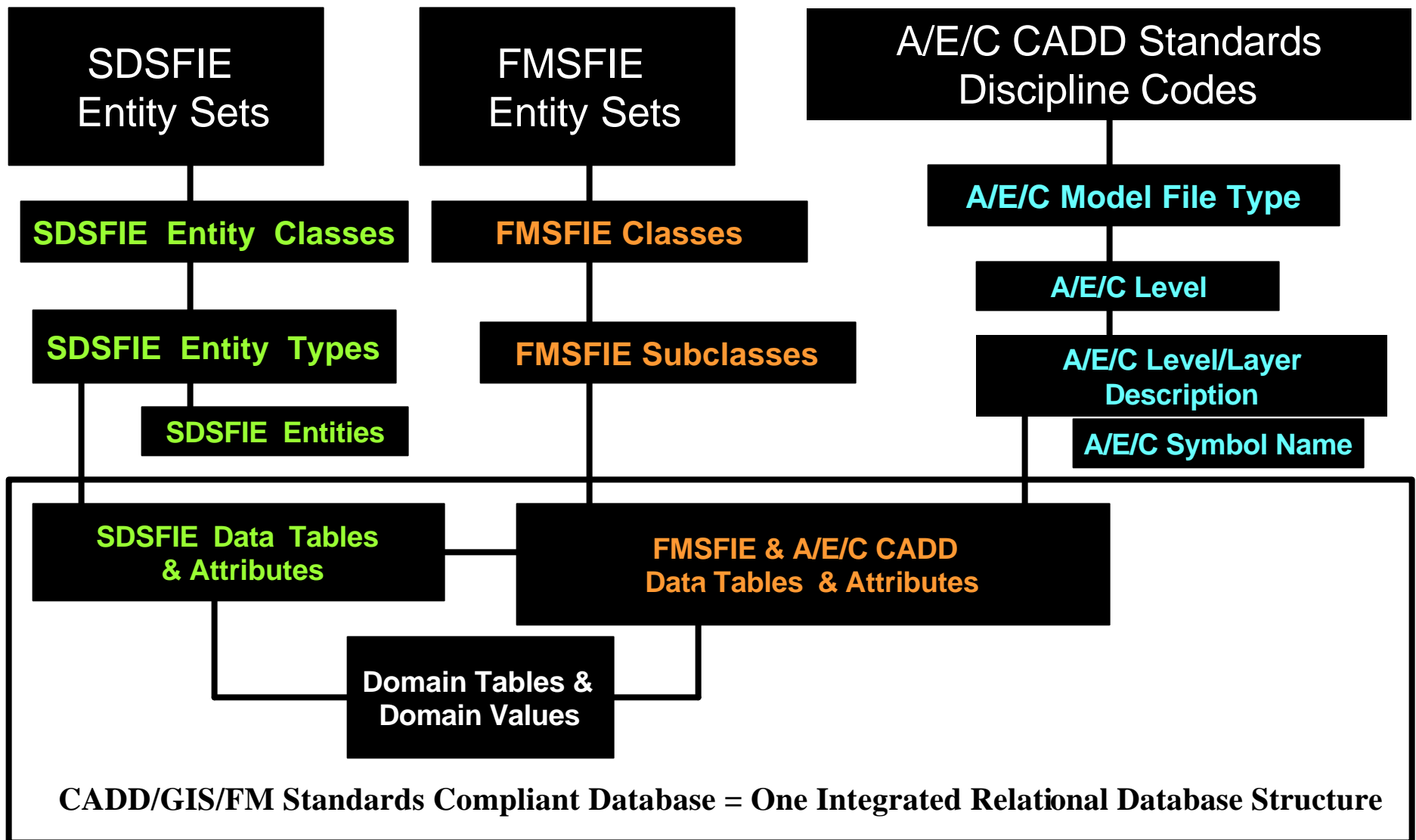
Local Governments in 30 States Have Requested the SDSFIE/FMSFIE



Arizona	Kentucky	Pennsylvania
California	Maryland	South Carolina
Colorado	Maine	Tennessee
Connecticut	Michigan	Texas
Florida	Minnesota	Utah
Georgia	Missouri	Virginia
Hawaii	North Carolina	
Idaho	New York	Washington
Illinois	Ohio	Wisconsin
Indiana	Oklahoma	
Kansas	Oregon	

CADD/GIS/FM Standards for Facilities, Infrastructure, & Environment (FIE) Data Model

(Option 2 Concept for incorporation of “transactional” FMSFIE with SDSFIE & A/E/C Standards.
Development of FMSFIE Entity Sets began in Fiscal Year 2001)



Bobby G. Carpenter, P.E.
Environmental Engineer

CADD/GIS Technology Center
for facilities, infrastructure, and environment
CEERD-ID-C

Army Engineer Research and Development Center
at Waterways Experiment Station
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

phone: 601-634-4572

fax: 601-634-4584

E-mail: carpenb@wes.army.mil

CADD/GIS Technology Center Internet URL : <http://tsc.wes.army.mil>